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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

BASS, DIRK R

ART UNIT

PAPER NUMBER

1777

MAIL DATE

DELIVERY MODE

10/18/2011

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/588,016	Applicant(s) WECHS, FRIEDBERT	
	Examiner DIRK BASS	Art Unit 1777	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 August 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-12 and 14-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4-12 and 14-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Applicant's response filed August 19, 2011 is acknowledged. Claims 1 and 12 are amended and claims 2-3, and 13 are cancelled. Claims 1, 4-12 and 14-18 are pending and further considered on the merits.

Response to Amendment

In response to the amendment, the examiner modifies the grounds of rejection set forth in the office action dated July 14, 2010.

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. **Claims 1, 4, 8-12, and 14-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakabayashi et al., USPA 2004/0045897 (Nakabayashi) in view of Cadotte et al., US 4765987 (Cadotte).
3. Regarding claims 1, 12, and 14-16, Nakabayashi discloses a method for production of an asymmetric hollow fiber membrane comprising:
 - a. Preparing a spinning solution comprising a membrane forming polymer and solvent system and converting the spinning solution by means of a forming device into a shaped object with a first and second surface (Ex. 1-8);
 - b. Bringing the first or second surface into contact with a precipitant system comprising a polyelectrolyte, wherein the precipitant system is such that formation of a membrane results in having a separating layer on said surface (¶ 0015, 0044); and

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- c. Washing and if necessary drying of the membrane (Ex. 1-8).
4. Nakabayashi does not explicitly disclose that the precipitant system comprises a polyelectrolyte having only negative fixed charges. However, it is well known in the art to functionalize membranes with negatively charged polymeric compositions as seen in Cadotte. Cadotte discloses modifying the surface of polyamide membranes with a variety of different materials including polyphosphoric acid (C3/L65-C4/L14) and copolymers of methacrylic acid and hydroxyalkyl methacrylate (C5/L56-C6/L1).
5. At the time of invention, it would have been obvious to one having ordinary skill in the art to modify the method of Nakabayashi to include precipitating the negatively charged polyelectrolyte on the membrane surface as disclosed by Cadotte in order to increase the flux, salt rejection, and cationic rejection rates of the membrane (Cadotte, C2/L1-5).
6. While Nakabayashi (in view of Cadotte) does not explicitly disclose that the polyelectrolyte has a molecular weight greater than 7000 Daltons, Cadotte recognizes that the molecular weight of the polyphosphoric acid is a result effective variable. Cadotte discloses that the molecular weight of the polyphosphoric acid must be great enough to provide the desired rejection enhancing properties, but not so great that the polymer adversely affects the characteristics of the treated membrane (C7/L4-10). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the molecular weight of the polyphosphoric acid, since it has been held that discovering the optimum or workable value of a result

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effective variable involves only routine skill in the art absent a showing of criticality or unexpected results (MPEP 2144.05, Section II, Part B).

7. Regarding claim 4, Nakabayashi (in view of Cadotte) discloses that the polyelectrolyte dissolved in the precipitant system precipitates in contact with the spinning solution (Ex. 1-8).

8. Regarding claims 8-9 and 17-18, Nakabayashi (in view of Cadotte) discloses that the membrane forming polymer used in step A is polysulfone (§ 0013).

9. Regarding claims 10-11, Nakabayashi (in view of Cadotte) discloses that in step B the forming device used is a hollow fiber die with an inner an outer side and that in step C the precipitant system is an interior filler that is brought into contact with the interior surface (Ex. 1-8).

10. **Claims 1, 4-12, and 14-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawata et al., EP 0568045 (Kawata, IDS) in view of Hou et al., WO 00/50160 (Hou, IDS).

11. Regarding claims 1, 4, 12, and 14-16, Kawata discloses an asymmetric membrane and a method of producing said asymmetric membrane (abstract, pg4/L44-50, Claim 6) comprising:

d. Preparation of a spinning solution comprising a membrane forming polymer and solvent system (Claim 6);

e. Conversion of the spinning solution by means of a forming device into a shaped object with a first and second surface (Claim 6);

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- f. Bringing the first and/or second surface into contact with a precipitant system comprising a polyelectrolyte with negative fixed charges but no positive fixed charges (Claim 6, 8) wherein said polyelectrolyte has a molecular weight greater than 7000 Daltons wherein said polyelectrolyte is a copolymer of vinylpyrrolidone and dimethylaminoethyl methacrylate (pg6/L26-32); and
- g. Washing, and if necessary, drying of the membrane (Examples).

12. Kawata discloses that the polyelectrolyte comprises a copolymer of vinylpyrrolidone and dimethylaminoethyl methacrylate (pg6/L26-32, Claim 8) but does not explicitly disclose that the copolymer comprises acrylic acid. However, membranes functionalized with acrylic acid monomers are well known in the art as evidenced by Hou. Hou discloses negatively charged membranes comprising a coating having pendant anionic groups, whereby said coating comprises an acrylic acid (Claims 1, 18).

13. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the method of Kawata to include acrylic acid in the polyelectrolyte solution as taught by Hou in order to increase fluid flow while also decreasing non-specific binding of proteins (Hou, pg. 2/L2-8).

14. Regarding claims 5-6, Kawata (in view of Hou) discloses a method wherein the proportion by weight of the polyelectrolyte is between 0.01 to 1 wt. % (Claim 6).

15. Regarding claim 7, Hou further discloses that the membrane forming polymer is a cellulosic polymer (pg. 18/L25-26).

16. Regarding claims 8-9 and 17-18, Kawata (in view of Hou) discloses a method wherein the membrane forming polymer is polysulfone (Claim 6).

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17. Regarding claims 10-11, Kawata (in view of Hou) discloses that the forming device is a hollow fiber die and that the precipitant system is an interior filler (Examples, Claim 6).

Response to Arguments

18. Applicant's arguments with respect to claims 1 and 12 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DIRK BASS whose telephone number is (571)270-7370. The examiner can normally be reached on Mon - Fri (9am-4pm).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571) 272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KRISHNAN S MENON/
Primary Examiner, Art Unit 1777

/DRB/
Dirk R. Bass